



OPERATIONAL RISK MANAGEMENT

User Training

User Training

- Deliberate ORM Process
- Hazard Identification Tools
- Hazard Assessment Tools
- Risk Assessment Tools

Operational Risk Management

Levels of Application

1. Time-critical - On the run consideration
- 2. Deliberate -
Application of the
Complete 5-Step
Process**
3. In-Depth - Complete 5-Step
Process With Detailed
Analysis

ORM Process

Deliberate ORM

1. Identify Hazards

A. Operational Analysis

B. Preliminary Hazard Analysis

2. Assess Hazards

3. Make Risk

Decisions

A. Control options

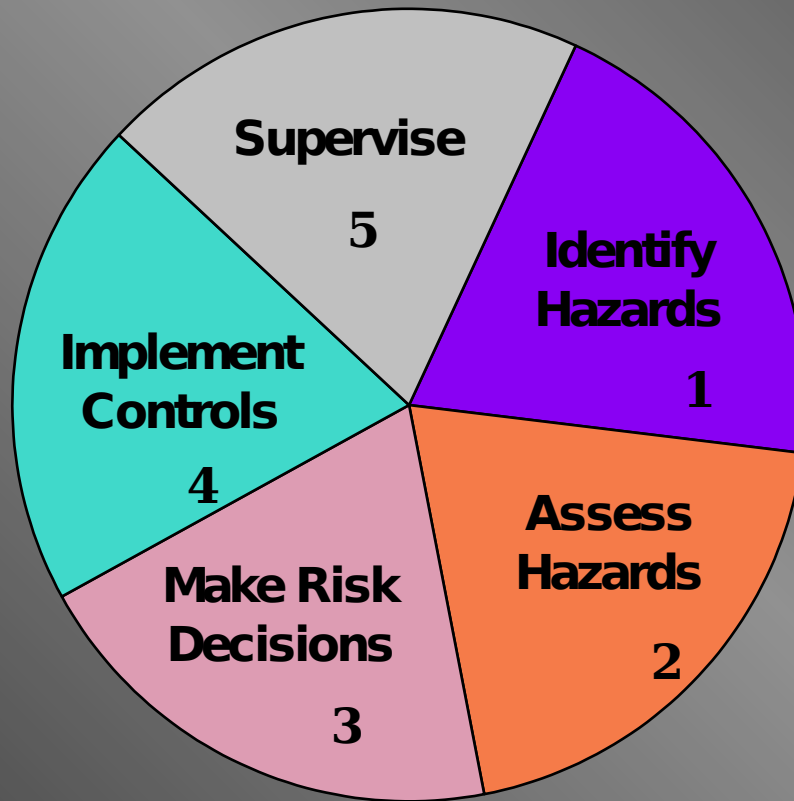
B. Risk vs. Benefit

C. Communicate

4. Implement Controls

5. Supervise

ORM Process



1. Identify Hazards

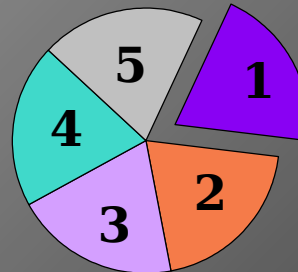
A. Operational Analysis

B. Preliminary Hazard Analysis

(1) List Negative Events

(2) List Hazards

(3) List Possible Causes



Operational Analysis

Flight Scheduling

1. Determine tasking and training requirements
2. Determine availability of A/C and flight times
3. Draft initial flights/times
4. Assign qualified crews who meet crewing criteria
5. Obtain COC approval
6. Publish schedule
7. Execute schedule

Preliminary Hazard

Analysis Flight Scheduling

Neg Evts: Hazards:

Causes:

Msn not acc Tasking > Assets

Misunderstanding
of tasking

Trng rqmts > Assets

Conflict btwn airfield
restrictions & trng/op rqmts

AC mishap Violation of currency/crew
rest rqmts

Miscommunication

Unexpected losses

Unclear tasking

Poor communication

Mixed signals fm multiple

Poor planning

Lack of funding

Error in fuel cost estimate

Unplanned maintenance

Night noise avoidance

Field maintenance

Bird activity

Scheduler overtasked

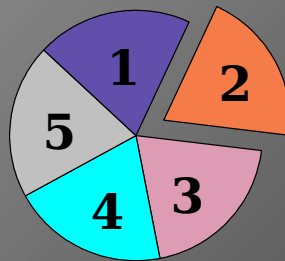
Inadequate passdown

Crew failed to rest during

2. Assess Hazards

**Prioritize Identified Hazards
based on:**

- **Severity of Possible Loss**
- **Probability of Possible Loss**



Hazard Assessment

Flight Scheduling

Hazard:	Severity	Probability	Priorit
Tasking > Assets	M	L	3
Misunderstanding of tasking 1		M	H
Trng Rqmts > Assets 2		M	M
Conflict btwn airfield 2 restrictions & trng/op rqmts		M	M

3. Make Risk Decisions

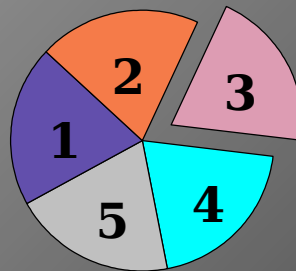
A. Consider Risk Control Options

(1) Most Serious Risks First

(2) Refer to PHA Causes

B. Risk vs. Benefit

C. Communicate as Required

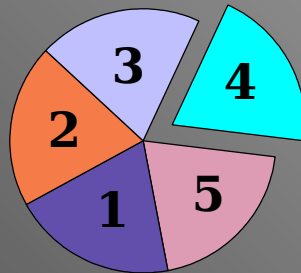


ORM Presentation Approaches

- Compare to Familiar Risks
- Total Losses Over Time
- Personal Impact
- Organizational Impact
- Cost Benefit

4. Implement Controls

- Engineering Controls
- Administrative Controls
- Personal Protective Equipment



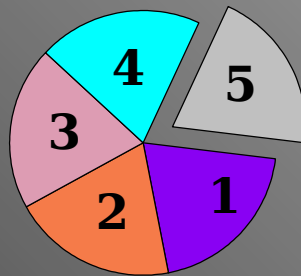
Controls

Flight Scheduling

1. Formal communication w/ COC regarding assets/readiness/tasking.
2. Up-to-date, accurate, long-term training plan w/ st projected rqmts.
3. Timely tracking system for flight hour expenditure
4. Personal Aircrew Counseling (promote awareness potential manpower losses, minimize frustration.)
5. Weekly meeting w/ Maint to discuss projected A/C availability.
6. Research alternate airfield capabilities for ops/trng
7. Scheduler's checklist/computer program for verify currency, crew rest, other schedule process steps.

5. Supervise

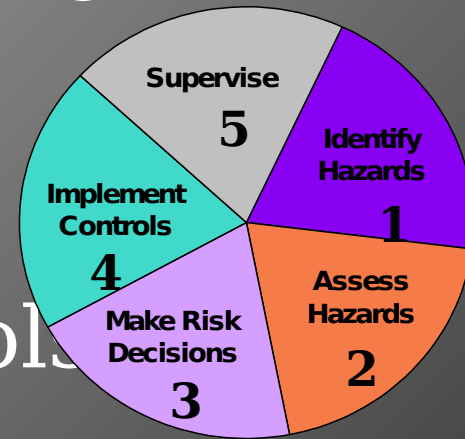
- **Monitor for Effectiveness of Controls**
 - **Watch for Changes**



ORM Process

Deliberate ORM

1. Identify Hazards
 - A. Operational Analysis
 - B. Preliminary Hazard Analysis
2. Assess Hazards
3. Make Risk Decisions
 - A. Control options
 - B. Risk vs. Benefit
 - C. Communicate
4. Implement Controls
5. Supervise



Deliberate ORM Demonstration

ORM Process

Deliberate ORM

1. Identify Hazards

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Basic Hazard Identification Tools

- **Operational Analysis:**

- Flow Chart
- Simultaneous Timed Events Thinking
- Affinity Diagram



- Preliminary Hazard Analysis:

- Change Analysis
- Brain Storming
- “What-if” and Scenario Thinking

Flow Chart

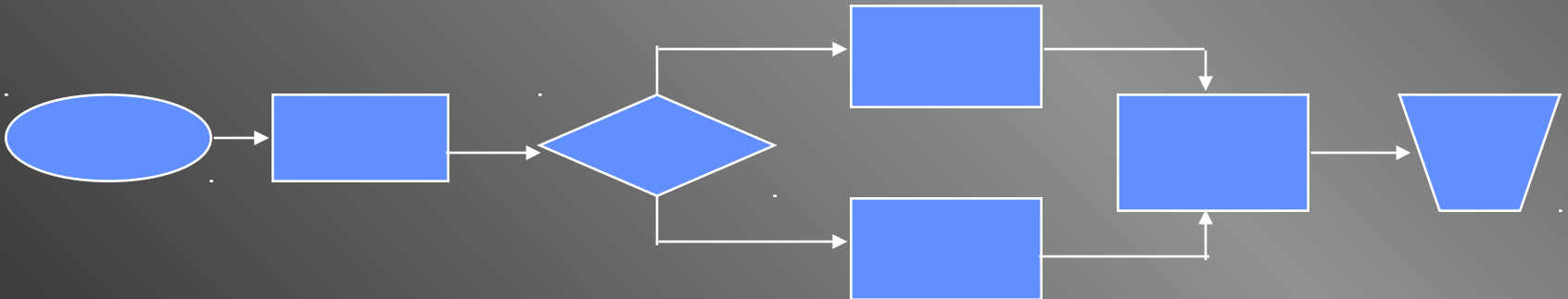
- Technique designed to depict the steps of an operation/process
- Application: Operational analysis
- Methodology:
 - Define the steps of an operation/process
 - Depict the interaction of each step



Flow Chart

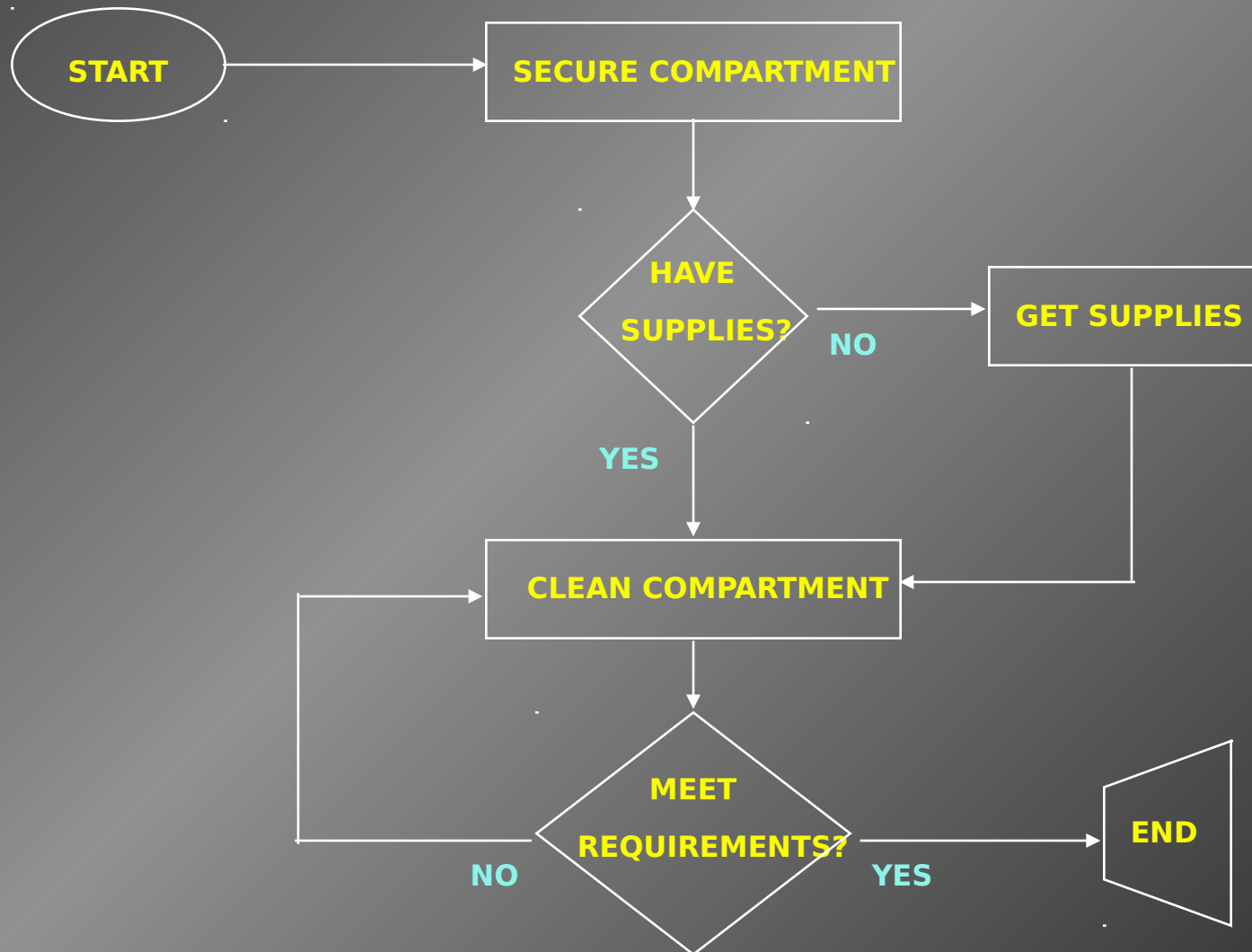
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- Promotes understanding
- Compares actual process with ideal process
- Reveals how steps relate to each other



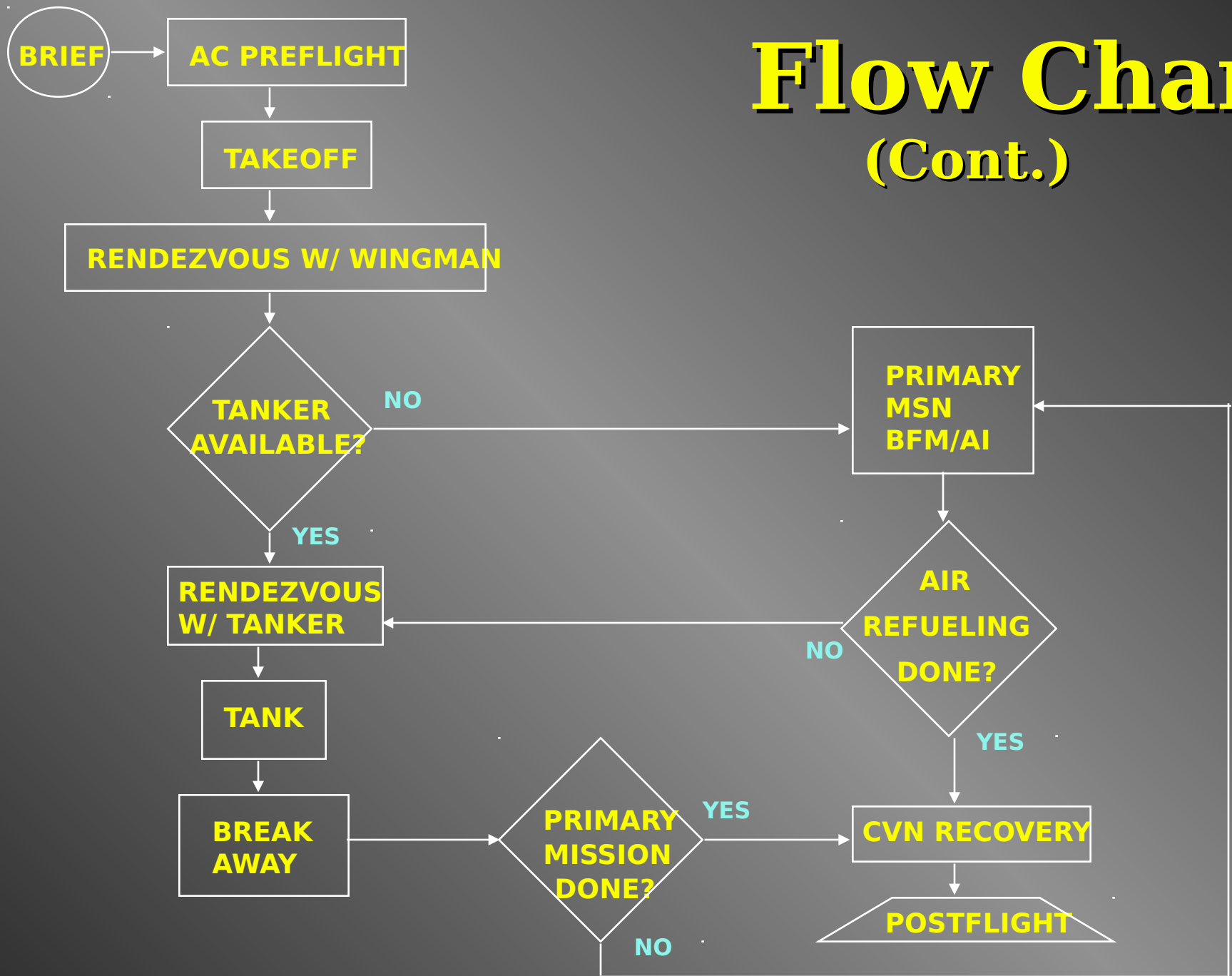
Flow Chart

(Cont.)



Flow Chart

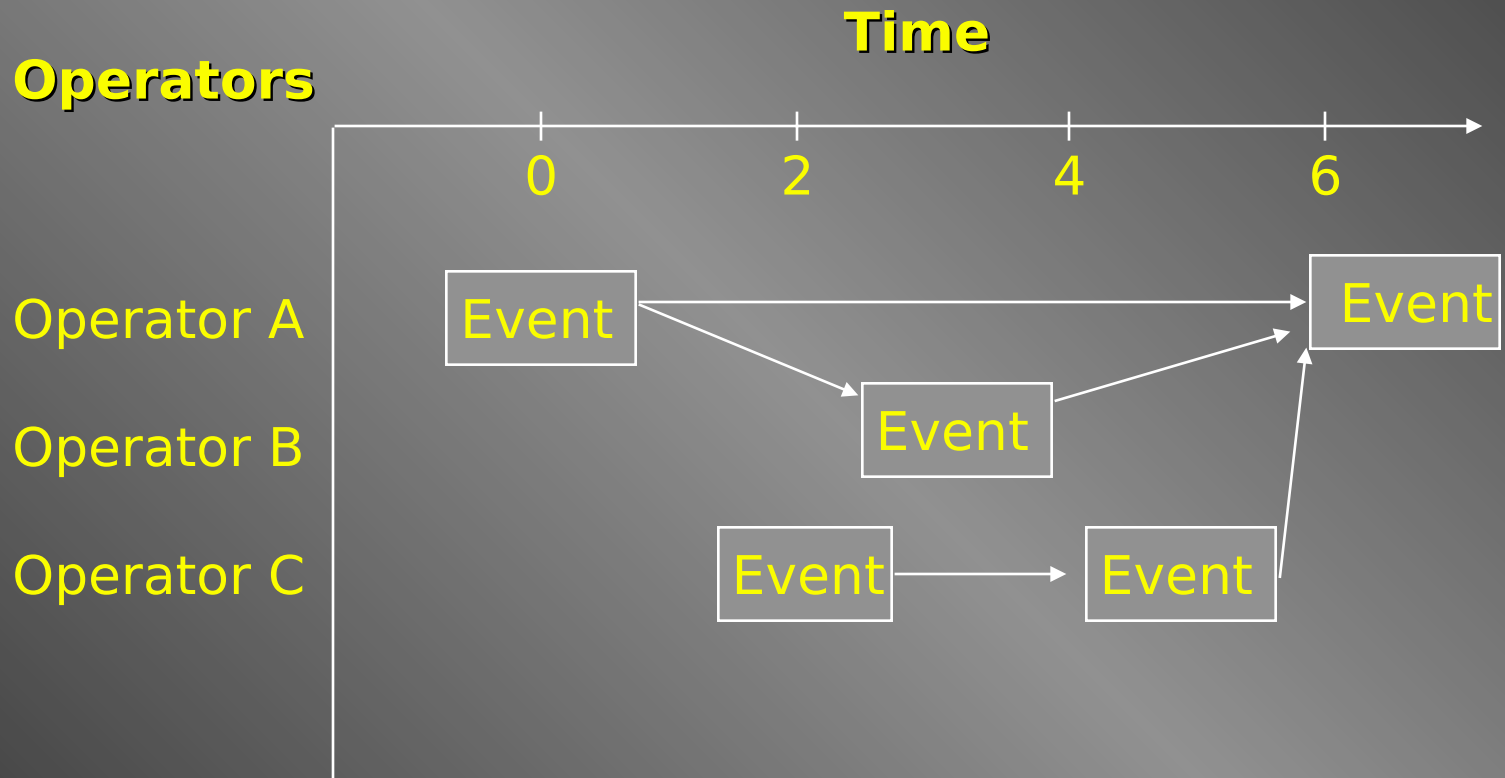
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Simultaneously Timed Events Plotting (STEP)

- Technique used to chart “busy” operations in which several activities take place at or near the same time.
- **Application: Operational Analysis**
- Methodology:
 - Define the “operators”
 - Define the “events”
 - Diagram chronologically on timeline

Simultaneously Timed Events Plotting (STEP)



STEP

(Cont.)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
610	[56 day]				[7]			[ASPA>						
611					[7]			[--112 day-->						
612	[-----224 day-----]				[7]			[14]						
613					[--112 day--]			[7]						
					[-----A Phase-----]									
614	[7]							[--112 day----]						
								[Wire mod ----->						
615	[7]				[----112 day----]									
					[-----Eng Chg-----]									
Dets					[-----Fallon Det 4 A/C-----]									

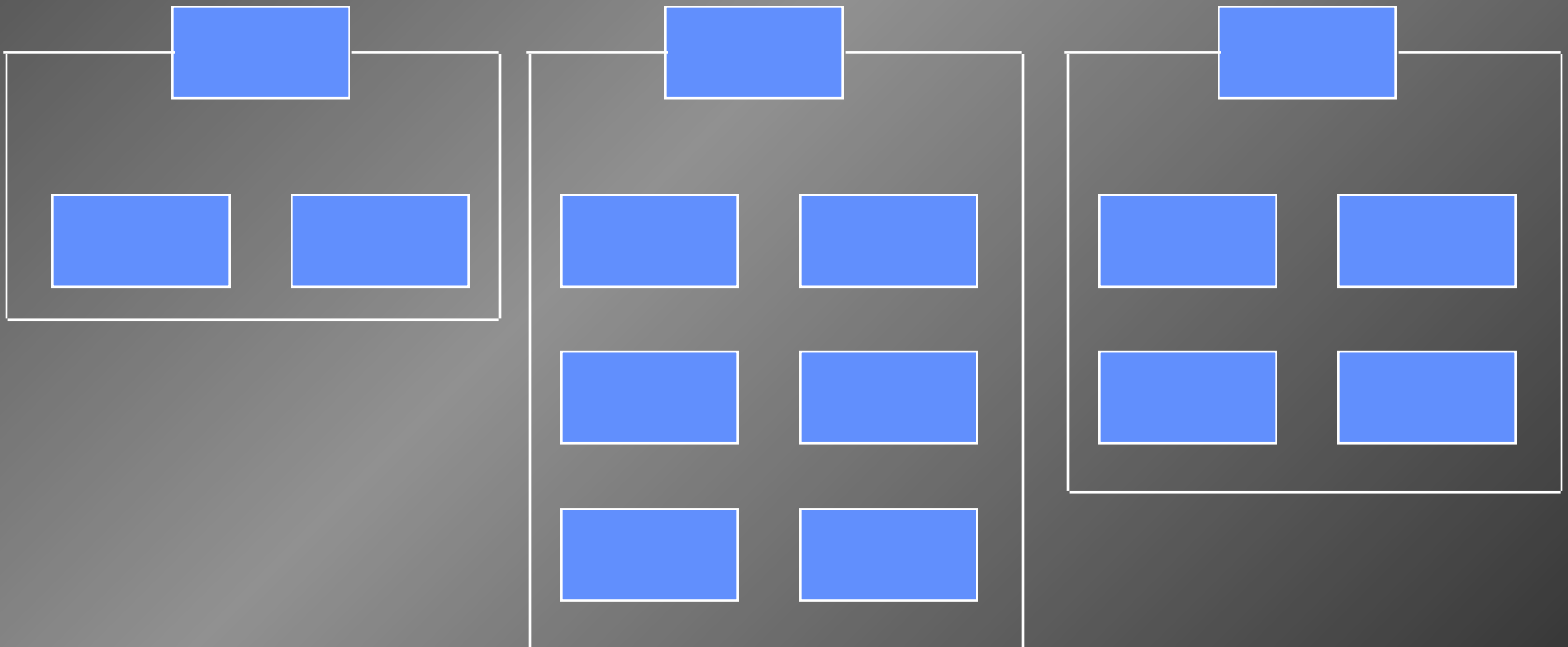
Affinity Diagram

- Technique which partitions a problem or issue into categories to focus brainstorming on one aspect of the problem at a time.
- Application: Operational Analysis and Preliminary Hazard Analysis
- Methodology:
 - Define the issue
 - Separate the issue into phases/categories
 - Brainstorm within each category
 - Collect/Display ideas

Affinity Diagram

(Cont.)

- More complete analysis of large volumes of data



Affinity Diagram

(Cont.)

H-46 Avionics Upgrade

Maintenance

Parts
SE/Test Equipment
Maintenance Manuals
Interface w/ other equip
QA

Training/Quals

Aircrew
Simulators
Maintenance
QARs

Preflight/Planning

Info for programming
Time for programming
Warm-up/test procedures

Flight Procedures

Emergency procedures
Navigation
Formation
NATOPS Manual

Tactical Applications

Vertrep
Fastrope
Troop Insertion/Extraction

Personnel Performance

Scan
Cockpit responsibilities
Habit patterns

Affinity Diagram Demonstration

Basic Hazard Identification Tools

- Operational Analysis:
 - Flow Chart
 - Simultaneous Timed Events F
 - Affinity Diagram
- **Preliminary Hazard Analysis:**
 - Change Analysis
 - Brain Storming
 - “What-if” and Scenario Thinking



Change Analysis

- Technique designed to identify hazards that arise from planned/unplanned change
- Applications:
 - Time critical ORM
 - Time-saving procedure for deliberate ORM
 - Investigative tool to detect changes that led to previous losses

Change Analysis

(Cont.)

- Methodology:
 - Review previous operation/current practices
 - Review Operational Analysis of planned operation
 - For each step/phase of the operation, identify differences (“changes”) between the two
 - Determine impact on risk of the operation

Change Analysis (Cont.)

Elements to Consider

WHO: Operator, Fellow
worker/unit, supervisor

WHAT: Equipment, Material, Energy

WHY: Trigger Event

WHERE: Environment

WHEN: Day/Night/Season, during
operation, in personnel

HOW: Procedures, schedule, controls

Change Analysis (Cont.)

VAQ Squadron NATO/Joint Deployment

- Transit to USAF base (X-country, trans-LANT, transport for maintenance/supply/admin assets, circadian rhythm disturbances, foreign ATC, etc.)
- Ground living conditions (transportation, food, water, medical support, personal needs, morale)
- Unique aircraft operating environment (RW, traffic patterns, temps, wx, mountains)
- Chain of command/operational tasking procedures
- Communications/language barriers
- Turnover procedures w/ NATO/other service A/C

Brainstorming

- Technique which guides a group in exchanging/generating ideas
- Application: Preliminary Hazard Analysis
 - Separately
 - With other tools
- Methodology:
 - State question and time limit
 - Share and record ideas
 - Discuss ideas to ensure understanding

Brainstorming

(Cont.)

Guidelines

- Encourage active participation by all
- Develop a high-energy, enthusiastic climate
- Do not criticize or compliment ideas as they are presented
- Encourage creative thinking, including “out of the box” ideas
- Build and expand on the ideas of others
- Try to generate as long a list as possible within the allotted time

“What-if” Analysis

- Technique designed to visualize possible events or scenarios which could develop during an operation or process.
- Application: Preliminary Hazard Analysis
 - Separately
 - With other tools

“What-if” Analysis

(Cont.)

- Methodology:
 - Develop an Operational Analysis of the operation
 - Apply a series of “what if” questions to each step/phase of the operation
 - Record identified hazards and causes
 - Expand into Scenario thinking, if desired

Guidelines for Scenario Development

- Target length - 5 or 6 sentences, 60 words
- Include elements of man, machine, material and method
- Start with history, but sanitize
- Encourage imagination and intuition
- Carry scenario to the worst credible outcome

Scenario Example

- An F-14 crew is on a refueling mission with an Air Force KC-135.
- The tanker climbs above 30,000' to avoid turbulence and weather.

Scenario Example

- An F-14 crew is on a refueling mission with an Air Force KC-135.
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- The tanker flies 50 knots faster than Navy tankers normally fly.

Scenario Example

- An F-14 crew is on a refueling mission with an Air Force KC-135.
- The tanker climbs above 30,000' to avoid turbulence and weather.
- The tanker flies 50 knots faster than Navy tankers normally fly.
- The F-14 must use intermittent afterburner to keep up with the tanker, resulting in a compressor stall on one engine.

Basic Hazard Identification Tools

- Operational Analysis:

- Flow Chart
- STEP
- Affinity Diagram



- Preliminary Hazard Analysis:

- Change Analysis
- Brain Storming
- “What-if” and Scenario Thinking

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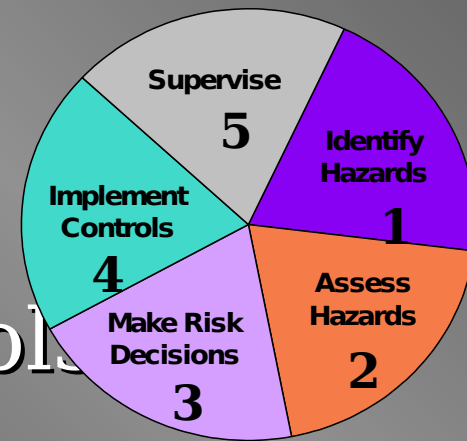
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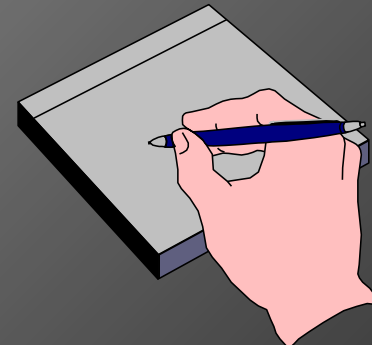
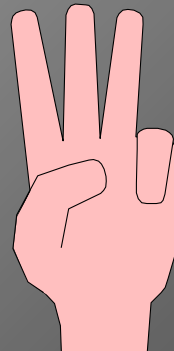
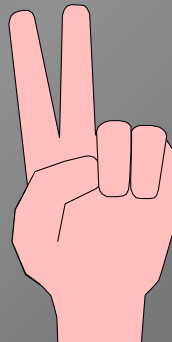
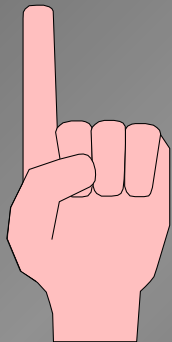


Hazard Assessment Tools

Risk Assessment Mat

		Probability			
Severity		A	B	C	D
	I	1	1	2	3
	II	1	2	3	4
	III	2	3	4	5
	IV	3	4	5	5

Command Task Risk Assessment (Ranking)



Risk Assessment Matrix

- Technique designed to assess the risk associated with a hazard, based on severity and probability
- Application: Any hazard assessment, including hazards identified by multiple sources.
- Methodology: For given hazard,
 - Estimate hazard severity
 - Estimate mishap probability
 - Assign Risk Assessment Code (RAC)

Risk Assessment Matrix

(Cont.)

Mishap Probability

Hazard Severity	Mishap Probability				
	A	B	C	D	
	I	1	1	2	3
	II	1	2	3	4
	III	2	3	4	5
	IV	3	4	5	5

Risk Assessment Matrix (Cont.)

- Subjective
- Less range than rankings
- Doesn't consider collective risk of multiple hazards

Risk Assessment Matrix

Example

	<u>Severity</u>	<u>Probability</u>	<u>RAC</u>
Tasking > Assets	II	D	4
Misunderstanding of tasking	II	B	2
Trng Rqmts > Assets	II	C	3
Conflict w/ Airfield Rest.	II	C	3
Currency/crew rest violation	I	D	3

Risk Assessment Matrix

Tailored RA Matrix

Hazard Severity

Probability (expected frequency) of Failure

	1/10	1/100	1/1000	1/10,000	1/100,000
I	1	2	4	8	12
II	3	5	6	10	15
III	7	9	11	14	17
IV	13	16	18	19	20

SSWG

Severity
if out of stock

Usage Rate (Probability)

	10/wk	5/wk	2/wk
NMC	1	2	3
PMC	2	3	4
FMC	3	4	5

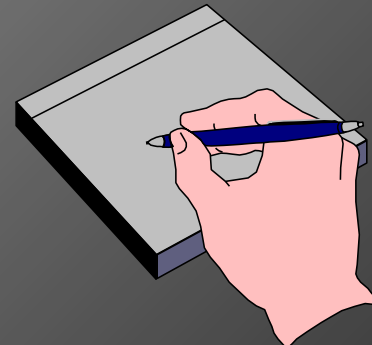
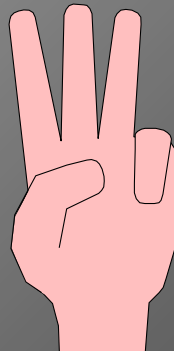
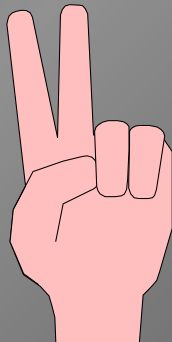
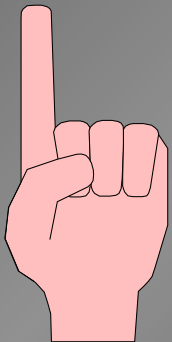
Supply
planning

Hazard Assessment Tools

Risk Assessment Matrix

Severity	Probability				
	A	B	C	D	
	I	1	1	2	3
	II	1	2	3	4
	III	2	3	4	5
	IV	3	4	5	5

Command Task Risk Assessment (Ra



Command Task Risk Assessment (Ranking)

- Technique which uses ranking to prioritize hazards according to severity and probability.
- Application: Relative assessment of hazards, especially suited to local command tasks.
- Methodology:
 - Rank hazards in order of severity
 - Rank hazards in order of probability
 - Add rankings for each hazard
 - Rank hazards by total

Command Task Risk Assessment

Hazard	Severity	Probability	Sum	Priority
A	3	1	4	1
B	1	4	5	2
C	4	2	6	3
D	2	5	7	4
E	5	3	8	5

Command Task Risk Assessment (Cont.)

- Entirely Relative
- Tendency to Minimize Low Ranking

Hazards

- Re-ranking Required for New Hazards

Command Task Risk Assessment (Cont.)

Example

	<u>Severity</u>	<u>Prob</u>	<u>Sum</u>	<u>Rank</u>	
Tasking > Assets	3	4	7	3	
Misunderstanding of tasking	2	1	3	1	
Trng Rqmts > Assets	5	2	7	3	
Conflict w/ Airfield Rest.	4	3	7	3	
Currency/crew rest violation	1	5	6	2	

Risk Assessment Tools

Identify Hazards and Assess their R

- Aviator RA Questionnaire
- Individual RA Questionnaires
 - On-duty
 - Off-duty/Leave
- Pre-flight/Scheduling RA Forms

Class Exercises

- **Tools Exercise**
- **Deliberate ORM Practical Exercise**

Basic Hazard Identification Tools

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- STEP
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Hazard Assessment Tools

Risk Assessment Matrix

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Command Task Risk Assessment (Ranking)

